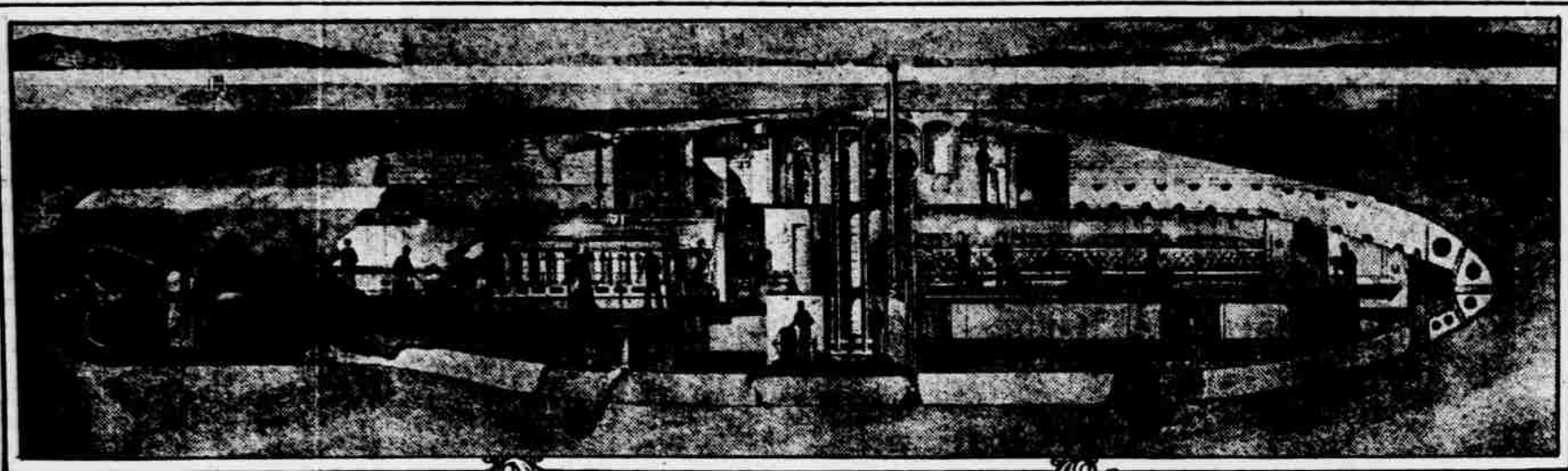


# Our Submarines Have Defied Ice Menace



SUBMARINE DESIGNED for UNDER-ICE SERVICE in the BALTIC SEA. A TYPE OF BOAT SUBMITTED to the RUSSIAN GOVERNMENT in 1905 by SIMON LAKE.

## Experiments Fifteen Years Ago Proved Ability to Cope With Situation Costing British Seven Vessels

By ROBERT G. SKERRETT.

PANGS of regret must have filled the hearts of the commanders and crews of the seven icebound British submarines blown up not long ago at Helsingfors. Seven perfectly good boats, they had to be blasted into bits because there was no way of getting them through the ice and preventing their capture by the advancing Germans.

Not only did the destruction of the boats represent a property sacrifice of quite \$2,500,000, but those British submarines had long evaded the efforts of the enemy to capture them and to sink them, and, what is more, their officers and crews had made splendid use of them in levying heavy toll upon both the merchant and the fighting fleets of the Teutons operating in the Baltic. The underwater craft were fit and well supplied with torpedoes to keep up their aggressive campaign, but unfortunately the winter put an end to their activities and held them immobile somewhere near the capital of Finland.

It is a matter of record that these subaqueous boats reached the Baltic by two routes. Some of them made their way boldly by way of the Skagerrack and the Kattegat into the Baltic, cunningly eluding the mine fields planted at various points by the Germans to halt just such a venture, while others of the flotilla made their journey via the Arctic Ocean and the White Sea to Archangel, thence reaching Kronstadt and the Gulf of Finland by inland water routes and overland by rail.

### Shipped by Railroads.

In this latter procedure they duplicated what was done during the Russo-Japanese war in moving American built submarines from Libau and Kronstadt east to Vladivostok, a feat afterward copied by the Germans in shipping U-boats from Kiel to the Adriatic.

The commanding officers of the British submarines were willing to try anything that offered a reasonable prospect of success. It was proposed by some of them that the ice should be broken up around their boats and a space cleared wide enough to get a start for a dive beneath the enveloping field. Then, when once under the water, the vessels could make a break for it below the ice and try to run to the open water which lay a comparatively short way out in the gulf.

Somehow this suggestion did not meet with general approval, and the majority vote was against the attempt on the score that it would wellnigh certainly prove disastrous. These youthful leaders in daring enterprise did not know that a precedent had been set for them along that very line, a precedent that demonstrated conclusively that just such an undertaking was practicable. The story is worth telling because it is another evidence of American initiative and also because it may yet lead to important developments before the present struggle comes to a close.

During the winter of 1903-04 the submarine torpedo boat Protector was at Newport, R. I., awaiting a tryout by the naval board of inspection and survey. At that time the army was far more

keenly interested in the craft than the naval authorities, especially because Mr. Lake's boat was able to travel upon the seabed and in its diving compartment possessed a feature which might be of great value in countermine or otherwise operating in connection with fixed submarine defences.

Accordingly three officers from the School of Submarine Defence at Port Totten were detailed to examine the vessel, and agreeably to a programme prepared by them, the Protector was put through her paces in Narragansett Bay on January 15, 1904. The weather had been very cold and the bay was covered with extensive floes of ice a foot or more thick. As part of the programme consisted in running submerged, it was necessary to drive the Protector under the ice.

Finally, when coming to the surface, the boat rose directly beneath a big floe, and notwithstanding the thickness of the ice the craft broke her way right through it and came up without difficulty, carrying a deckload of ice. She suffered no damage bodily and the only thing broken was a light spar used as a signal mast. Her periscope, although exposed at the time, was in nowise injured.

### Best Attacked From Below.

This demonstration was no part of the prescribed official programme, but Mr. Lake had taken advantage of the opportunity to prove a contention of his. He had repeatedly argued that the line of least resistance of ice was that presented to an attack from below, for then it was without the natural support of the water. The occasion offered by the visit of the officers from the School of Submarine Defence was too good to be missed—his board of directors would probably have frowned upon a test of that sort—and when the submarine run was finished Mr. Lake deliberately brought the Protector surfaceward under a floe which he had spotted through the periscope shortly before.

It was evident to him, upon reflection afterward, that something might have happened to the Protector's observing instrument, and had it been ruptured the boat might have filled with water if she could not break through the ice and rise clear of the surface. Therefore, as a safeguarding provision, a few days later he fitted the craft with a timber falsework which was designed to act like the in-

verted runner of a sled and slide along in contact with the nether side of a field or floe of ice.

This arrangement was shaped so that it would protect all structures rising above the boat's deck line, and the slanting portion, forward and aft, was intended to facilitate diving beneath the ice or in breaking through it when returning to the surface. Although rather cumbersome, being in fact merely a temporary makeshift, still the installation was undoubtedly correct in its conception. It happened that a moderation of the weather gave Mr. Lake no further chance to go skating beneath Narragansett Bay, but his experience satisfied the inventor that the time would surely come when his novel scheme would be of pronounced military value.

### Designed a Special Ice Type.

The Protector was sold to the Russian Government in 1904 and other boats of similar pattern were built by Mr. Lake's company for the Muscovite navy. This work took him and his staff to Europe, and a year later, after having familiarized himself with seasonal conditions in the Baltic and the strategic limitations imposed by the long winters, he designed an extremely novel type of subaqueous torpedo boat. He offered this to the imperial authorities as a means of carrying on an aggressive naval campaign during any part of the year. In describing his under ice submersible he said:

"This vessel is designed to meet the conditions peculiar to certain northern countries in which the harbors are more or less icebound and navigation is closed during several months of the year. It should be clear to those bent upon the defence of such icebound harbors or bays that the ordinary surface craft are, unless the way is kept open by ice breakers, absolutely useless during this period.

"There are circumstances, however, during such a season under which the foe might get within bombarding distance without fear of retaliation on the part of the iceblocked ships of the defence, and because of freedom of movement the enemy might be able to choose positions completely beyond the lines of fire of the defending vessels held immobile by the surrounding ice. Under these conditions the only possible effective retaliation would be by means of submarine vessels capable of running securely under the



AFTER an UNDER WATER RUN in the WINTER TIME.

## Simon Lake Also Devised Special Type for Russian Conditions, Including Iceboring Periscopes

ice and being provided with facilities especially adapting them for this rather strange or untried field of operation.

"The present boat is designed to meet these circumstances and provides all the elements essential to safety, secrecy and certainty from attack. To this end the present design embraces some very unusual features, and everything has been carefully developed to make her efficient and to make her strong enough to meet securely the hazards involved in this service."

### Details Never Before Published.

Details regarding this type have never heretofore been published, but the distinctive characteristics are thoroughly well known to our present enemies, and therefore there is no impropriety now in revealing some of them to the public.

To begin with, the shape of the upper hull is such as to facilitate just those operations which Mr. Lake had in mind in 1904 when he equipped the Protector experimentally with under ice runners so to speak. Investigation shortly after reaching Russia had made him generally familiar with the nature and the extent of the ice formations in the Baltic. Data in this direction had been gathered some years previously while Vice-Admiral Makaroff was trying out his notable ice-breaker, the Yermak.

As a broad proposition that scientific naval officer had found the Baltic ice where thickest to average not more than two or three feet, and because it was fresh water ice it was firmer than that of the Arctic Sea. But its very hardness made it crack more widely when attacked, this hardness involving brittleness and the rapid spread of an initial cleavage following upon a blow.

The under ice submersible planned by Mr. Lake had a displacement of several hundred tons and its reserve buoyancy was large when in the light condition. Therefore if the craft were brought immediately beneath a floe and given the rising impulse of suddenly exhausted ballast tanks her uplifting momentum would certainly suffice to heave up and break ice of still greater thickness than that generally prevailing in the Baltic.

### Necessity May Arise Soon.

From a strategic or tactical viewpoint this procedure might not be the most desirable, for it would probably betray the presence of the submarine to a watchful foe. Manifestly it would be impossible to attack an enemy without knowing his exact position and being able to get near enough to launch the torpedoes directly at their target.

It was equally plain that the underwater craft would have to observe her target and likewise have some way of keeping tabs upon the distance travelled submerged. Here is where the inventor's ingenuity came into play.

A spiked wheel suspended at the end of a freely moving arm was placed at a point on the upper ridge of the hull where the wheel could engage the nether surface of the ice and by means of suitable gearings perform the function of a cyclometer and register within the vessel the number of yards and knots run. The beauty of this arrangement was that it would give a positive record of progress as against the uncertainty existing where